

72535
Impact Melt Breccia
221.4 grams



Figure 1: Photo of 72535. Cube is 1 cm. S73-19580. Note the clast on right side.



Figure 2: Photo of 72535. Cube is 1 cm. S73-19581. Note the black glass splash.

Introduction

Rake sample 72535 is an impact melt breccia from the landslide off of the South Massif. It has an Ar/Ar age of ~3.9 b.y. with 107 m.y. exposure to cosmic radiation.

Petrography

72535 is covered with micrometeorite craters (figures 1 and 2). It is a fine-grained, clast-bearing impact melt rather typical of the Apollo 17 highland breccias (figure

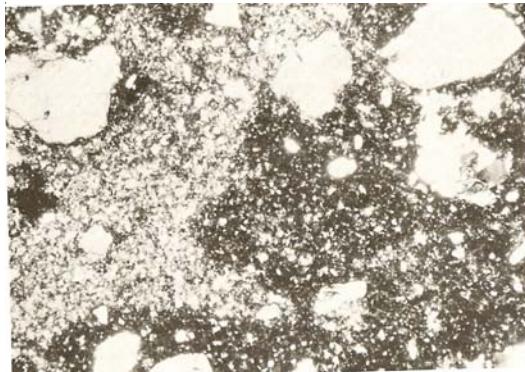


Figure 3: Photomicrograph of thin section of 72535 (from Warner et al. 1978).

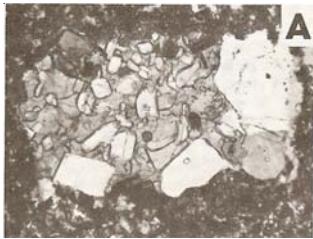


Figure 4: Poikilitic clast in 72535 (from Warner et al. 1977). Field of view 1 mm. Single large orthopyroxene encloses rounded olivine and euhedral plagioclase.

Mineralogical Mode for 72535

Warner et al. 1978

Plagioclase	53 %
Mafic minerals	44
Opaques	3

3). Warner et al. (1977) and Ryder (1993) describe the dark porous groundmass as basaltic-textured, with plagioclase laths less than 30 microns long subophitically enclosed by irregular mafic crystals. Ca-plagioclase is the major mineral clast. Small lithic clasts make up about ~5 % of the sample (figure 4).

Mineralogy

Olivine: Olivine is Fo_{70-86} .

Pyroxene: Warner et al. (1978) determined the composition of pyroxene in the matrix and in clasts of 72535 (figure 5).

Plagioclase: Plagioclase ranges from An_{97} to An_{72} .

Ilmenite: Engelhardt (1997) reported ilmenite.

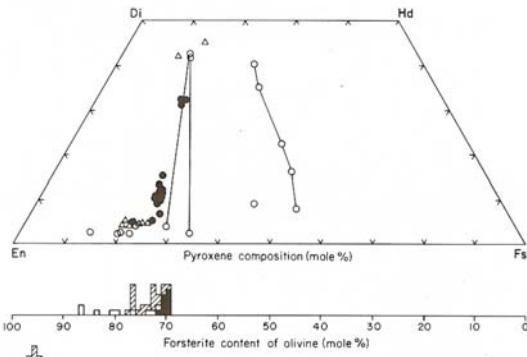


Figure 5: Composition of pyroxene and olivine in 72535 (from Warner et al. 1978).

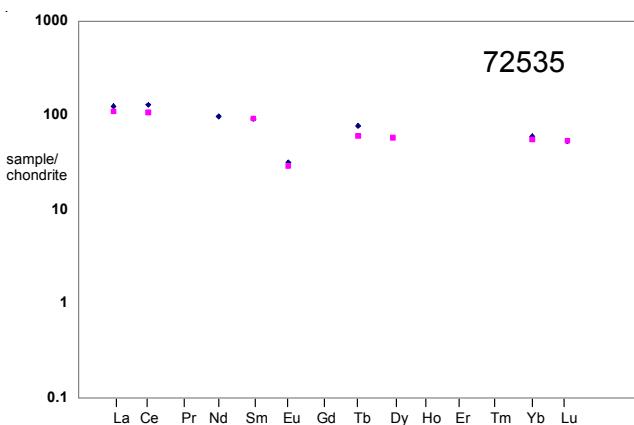


Figure 6: Normalized rare-earth-element diagram for 72535 (data from Lau and Schmitt 1975 and Dalrymple and Ryder 1996).

Chemistry

Laul and Schmitt (1975) and Dalrymple and Ryder (1996) have analyzed 72535 and find that it is similar to the nearby boulder #2 (figure 6). The sample has high meteoritic siderophiles (Ni 250 ppm, Ir 7 ppb).

Radiogenic age dating

Dalrymple and Ryder (1996) determined an Ar/Ar plateau age of 3.887 ± 0.016 b.y. (figure 7) - finding that this sample is probably an impact melt from Serenitatis.

Cosmogenic isotopes and exposure ages

Arvidson et al. (1976) reported an exposure age of 107 m.y. by ^{81}Kr .

Summary of Age Data for 72535

Ar/Ar
Dalrymple and Ryder 1996 3.887 ± 0.016 b.y.

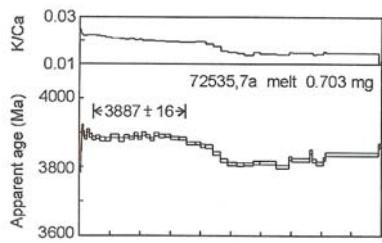


Figure 7: Ar/Ar plateau age diagram for 72535
(from Dalrymple and Ryder 1996).

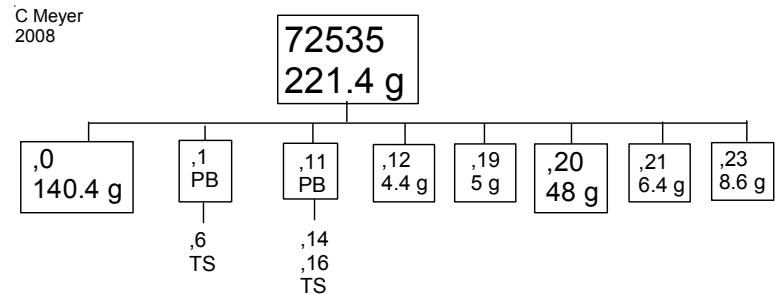


Table 1. Chemical composition of 72535.

reference	Dalrymple 96	Laul75	Warner77	
weight				
SiO ₂ %	45.6	(b)	47.9	(c)
TiO ₂	1.5	(b)	1.4	(a) 1.68 (c)
Al ₂ O ₃	17.7	(b)	17.8	(a) 18.1 (c)
FeO	9.1	(a)	8.4	(a) 8.7 (c)
MnO	0.11	(b)	0.099	(a) 0.13 (c)
MgO	13.2	(b)	11	(a) 10.6 (c)
CaO	11.2	(b)	11.2	(a) 11.9 (c)
Na ₂ O	0.56	(a)	0.58	(a) 0.54 (c)
K ₂ O	0.32	(a)	0.13	(a) 0.07 (c)
P ₂ O ₅				0.27 (c)
S %				
sum				
Sc ppm	19.3	(a)	16	(a)
V			40	(a)
Cr	17.91	(a)	1300	(a) 1163 (c)
Co	29	(a)	29.2	(a)
Ni	220	(a)	250	(a)
Cu				
Zn				
Ga				
Ge ppb				
As				
Se				
Rb				
Sr	150	(a)		
Y				
Zr	290	(a)	400	(a)
Nb				
Mo				
Ru				
Rh				
Pd ppb				
Ag ppb				
Cd ppb				
In ppb				
Sn ppb				
Sb ppb				
Te ppb				
Cs ppm	0.19	(a)		
Ba	315	(a)	300	(a)
La	29.1	(a)	25.8	(a)
Ce	77.9	(a)	65	(a)
Pr				
Nd	44	(a)		
Sm	13.5	(a)	13.6	(a)
Eu	1.77	(a)	1.62	(a)
Gd				
Tb	2.8	(a)	2.2	(a)
Dy			14	(a)
Ho				
Er				
Tm				
Yb	9.8	(a)	9	(a)
Lu	1.3	(a)	1.3	(a)
Hf	10.3	(a)	8.7	(a)
Ta	1.33	(a)	1.2	(a)
W ppb				
Re ppb				
Os ppb				
Ir ppb	7	(a)		
Pt ppb				
Au ppb	12.3	(a)		
Th ppm	4.3	(a)	3.4	(a)
U ppm	1.33	(a)		
technique:	(a) INAA, (b) Fused bead, (c) broad beam e-probe			

References for 72535

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